

Short communication

Seroprevalence of *Toxoplasma gondii* antibodies in captive elephants (*Elephas maximus maximus*) in Sri Lanka

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Abstract

Serum samples collected during August 2003–June 2004 from 45 privately owned captive and 8 elephants from the Pinnawala Elephant Orphanage were tested for the presence of antibodies against *Toxoplasma gondii* using the direct modified agglutination test (MAT). Antibodies were found in sera of 14 of 45 (32%) privately owned elephants with titers of 1:25 in three, 1:50 in three, 1:100 in three, 1:200 in three, and 1:400 in three elephants. The elephants from Pinnawala Elephant Orphanage were seronegative. This is the first report of *T. gondii* seroprevalence in elephants in Sri Lanka.

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Keywords: Elephants; *Elephas maximus maximus*; Sri Lanka; Modified agglutination test

1. Introduction

Toxoplasma gondii infections are widely prevalent in human beings and animals worldwide (Dubey and Beattie, 1988). Humans become infected post-natally by ingesting tissue cysts from undercooked meat, consuming food, or drinks contaminated with oocysts,

or by accidentally ingesting oocysts from the environment. Approximately 20–40% of the total population of women are infected with this parasite, in several countries including Sri Lanka (Ekanayake and Kurukulasuriya, 1995). Domestic cats are important in maintaining the infection among urban settings. However, the recent study on serological evidence in wild monkeys suggested the role of wild felids in the maintenance of the sylvatic cycle of this parasite in Sri Lanka (Ekanayake et al., 2004). Although the infection is widely prevalent in human and livestock,

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very little is known of *T. gondii* infection and its epidemiology in elephants. Approximately 45% of captive elephants (*Elephas maximus indicus*) in Thailand had antibodies to *T. gondii* (Tuntasuvan et al., 2001). The infection has been reported from 3 of 63 of captive African elephants (*Loxodonta africana*) in USA (Riemann et al., 1974).

Captive and privately owned elephants, which are about 190 in total in Sri Lanka, have very close relationship with people mainly due to cultural and religious reasons. We report seroprevalence of *T. gondii* antibodies from 53 elephants from Sri Lanka.

2. Materials and methods

Blood samples from ear vein were collected from 45 privately owned captive elephants in Sri Lanka during August 2003–June 2004. The eight sampled elephants were from Pinnawala Elephant orphanage and others from 5 different districts among the 11 districts in Sri Lanka in which captive elephants are managed today. The samples were transported into the laboratory within 6 h of collection and the sera were separated and stored at -70°C until tested for the presence of antibodies against *T. gondii* using the direct modified agglutination test (MAT) as described by Dubey and Desmonts (1987). Sera were diluted two-fold, 1:25–1:400.

Statistical analysis was done using the Minitab statistical package (Minitab release 11.32). The difference between titres on gender was statistically examined using Chi-square test considering 1:25 as the cut off point ($P=0.05$). The age of elephants was categorised into three groups 20–40, 40–60, and >60 for the purpose of analysis. The relationship between the approximate age and the antibody titer was analysed using one way analysis of variance ($P=0.05$).

3. Results and discussion

Antibodies to *T. gondii* were found in sera of 15 of 45 (33.3%) elephants, with titers of 1:25 in three, 1:50 in three, 1:100 in three, 1:200 in three, and 1:400 in three elephants. A significantly high number of females (14/29) were positive for *T. gondii* antibodies

Table 1
Seroprevalence of *Toxoplasma gondii* antibodies by age group

Age group (year)	No. of elephants tested	No. of positive (MAT > 1:25)	Positive (%)
<40	18	3	17
40–60	14	5	35
60–65	13	4	31

compared to males ($P=0.02$). There was no significant difference in the presence of antibody in different age groups ($P=0.45$) (Table 1). None of the four females or four males from Pinnawala Orphanage had antibodies to *T. gondii*.

Results of the present study indicate that 28.3% of elephants were exposed to *T. gondii*, similar to exposure rate in humans. Elephants are herbivore and their life span is similar to that of humans. They probably became infected by ingesting oocysts from the environment. We did not have the opportunity to test elephants younger than 20 years of age. Therefore, we have no data on congenital transmission of *T. gondii* in elephants. There is no report of clinical toxoplasmosis in elephants. We used the MAT in the present study because it is considered specific for the detection of antibodies to *T. gondii* in humans and other animals (Dubey and Beattie, 1988; Dubey et al., 1995, 2005). The previous study in elephants in Thailand was also based on MAT (Tuntasuvan et al., 2001).

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